

CLAIMS

I claim:

1 A hydrant knock-off flow stop valve comprising:

2 a generally cylindrical, vertically oriented, bulbous wall
3 defining a central, vertical axis;

4 an upper flange having circumferential recess so located
5 as to receive a break ring for breakaway attachment of the
6 lower flange of a wet hydrant;

7 a lower flange for connection with a fluid system supply
8 riser.

9 a plurality of vertically disposed, circumferentially
10 spaced vanes extending radially inward from said bulbous wall,
11 said vanes having inner edges defining vertically oriented
12 guides, said guides defining a generally cylindrical valve
13 member guide;

14 said bulbous wall forming a circumferential upper valve
15 seat spaced below said upper flange along the interior wall
16 thereof;

17 a valve element free for vertical movement within said
18 generally cylindrical valve member guide and so configured as
19 to seal against said upper valve seat, closing upward flow of
20 fluid through said valve; and

21 a valve element restraining cage located in the upper
22 portion of said valve, said cage having a centrally located
23 valve member seat, a circumferential cage retaining ring spaced
24 upward from said valve member seat, and a plurality of radially
25 spaced cage legs extending between said valve member seat and
26 said cage retaining ring;

27 said upper flange defining an inner upward-opening cage
28 retaining ring groove;

29 said valve element restraining cage having said
30 circumferential cage retaining ring removably located within
31 said upward-opening cage retaining ring groove, said valve
32 member seat being spaced below said upper circumferential seat
33 by said plurality of spaced cage legs;

34 whereby, system water flows through the riser, upward
35 between said vanes, through said cage legs, and through said
upper flange for supply of water to the wet hydrant; and

37 whereby, upon the hydrant being accidentally impacted such
38 that the break ring shears, water pressure acts upon said valve
39 element, driving said cage upward, away from said valve and
40 allowing said valve element to travel upward to said upper
41 circumferential seat, forming a seal therewith and stopping
42 water flow through said valve.

1 2. The valve of claim 1, further comprising a
2 circumferential lower valve seat ring mounted on the inner
3 circumference of said lower valve flange and defining a
4 circumferential lower valve seat at the upper end thereof;

5 whereby, upon a backpressure event occurring in said
6 valve, said valve element engages said lower seal by action of
7 gravity and fluid pressure, acting as a check valve against
8 backflow of fluid into the riser and supply system.

9 3. The valve of claim 1, wherein the inner side of said
10 upper flange slopes upward and outward, and said cage legs
11 extend upward and outward from said valve element seat and fit
12 against and are partially supported by the inner side of said
13 upper flange.

1 4. The valve of claim 3, wherein said valve element
2 restraining cage restraining ring is held in place by said
3 hydrant flange and said valve element restraining cage
4 restraining ring is freed upon separation of said hydrant from
5 said valve upper flange, allowing said restraining cage to
6 separate from said valve, allowing said valve element to lift
7 and stop fluid flow.

1 5. The valve of claim 1, wherein said valve element is in
2 the form of a ball or globe.

1 6. The valve of claim 5, wherein said valve element is a
2 hollow sphere having a covering of a soft plastic layer.

1 7. The valve of claim 6, wherein said valve element is
2 made of cast iron.

1 8. The valve of claim 1, wherein said valve element
2 comprises:

3 a double ended valve element having upper and lower
4 mushroom elements, having an upper, mushroom shaped upper
5 surface and a lower, inverted mushroom shape lower surface,
6 respectively, each of said upper and lower mushroom shape

7 elements having supporting stems having respective mushroom
8 inner ends and free ends and defining axial recesses extending
9 along their respective lengths,

10 a common, vertical axial support shaft having a separation
11 plate mounted along the length thereof at about the
12 longitudinal center, said supporting stems being slidably
13 mounted over said common vertical axial support shaft and
14 toward said separation plate; and

15 coaxial coil springs extending from said separation plate
16 to the respective inner ends of said stems;

17 whereby upon said hydrant if broken away at its lower
18 flange by the shearing of said break ring, and the separation
19 of said support cage, said upper mushroom element is forced
20 upward under spring pressure to seal against said upper
21 circumferential upper seal.

1 9. The valve of claim 2, wherein said valve element
2 comprises:

3 a double ended, upper and lower double mushroom elements,
4 having an upper, mushroom shape upper surface and a lower,
5 inverted mushroom shape lower surface, each said upper and

6 lower mushroom shape elements having supporting stems having
7 respective mushroom inner ends and free ends and defining axial
8 recesses extending along their respective lengths,

9 a common, vertical axial support shaft longitudinal
10 center, said supporting stems slidably mounted through their
11 respective free ends over said common vertical axial support
12 shaft; and

13 a coaxial coil spring extending coaxially over said stems
14 between said mushroom element inner ends;

15 whereby, upon said hydrant being broken away at its lower
16 flange by the shearing of said break ring, and the separation
17 of said support cage, said upper mushroom element is forced by
18 spring pressure to seal against said upper circumferential
19 upper seal.

1 10. The valve of claim 8, further comprising a
2 circumferential lower valve seat ring mounted on the inner
3 circumference of said lower valve flange and defining a
4 circumferential lower valve seat at the upper end thereof;

5 whereby, upon a backpressure event occurring within said
6 valve, said valve element engages said lower seal by action of

7 spring and fluid pressure, said valve acting as a check valve
8 against backflow of fluid into the riser and supply system.

1 11. The valve of claim 9, further comprising a
2 circumferential lower valve seat ring mounted on the inner
3 circumference of said lower valve flange and defining a
4 circumferential lower valve seat at the upper end thereof;

5 whereby, upon a backpressure event occurring within said
6 valve, said valve element engages said lower seal by action of
7 spring pressure and fluid pressure, acting as a check valve
8 against backflow of fluid into the riser and supply system.

1 12. A hydrant knock-off flow stop valve comprising:

2 a generally cylindrical, vertically oriented, bulbous wall
3 defining an central, vertical axis;

4 an upper flange having a circumferential recess so located
5 as to receive a break ring for breakaway attachment to the
6 lower flange of a wet hydrant;

7 a lower flange for connection with a fluid system supply
8 riser;

9 said bulbous wall being split at its midsection into upper
10 and lower generally hemispheric outer walls having engaging
11 flanges;

12 a valve element support spider having an axially located
13 hub, an outer circular rim, and a plurality of spider spokes
14 extending between said hub and said rim and spaced radially
15 therearound;

16 said outer wall engaging flanges forming corresponding
17 inner half-grooves at their intersection, said outer circular
18 rim being supported within the groove formed by said half-
19 grooves when said flanges are mated;

20 a vertical, axial support shaft supported by and extending
21 axially at least upward from said axially located hub, forming
22 an upper portion thereof;

23 said valve element comprising a first upper mushroom valve
24 element, said upper mushroom valve element having a mushroom
25 shaped, generally hemispheric, upper surface and having a
26 downward extending supporting stem having an inner end and a
27 free end and defining an axial recess therein, said free end
28 extending over and slidably engaging said upper portion of

29 said axial support shaft, said upper mushroom valve element
30 having a coil spring surrounding said stem from said inner end
31 to said support spider hub;

32 said upper hemispheric wall forming a circumferential
33 upper valve seat spaced below said upper flange along the
34 interior wall thereof, said valve seat forming a seal upon
35 engaging said mushroom shaped upper surface of said upper valve
36 element so as to stop fluid flowing upward through said valve;
37 and

38 a valve element restraining cage located in the upper
39 portion of said valve, said cage having a centrally located
40 valve member seat, a circumferential cage retaining ring spaced
41 upward from said valve member seat, and a plurality of radially
42 spaced cage legs extending between said valve member seat and
43 said cage retaining ring;

44 said upper flange defining an inner upward-opening cage
45 retaining ring groove;

46 said valve element restraining cage having said
47 circumferential cage retaining ring removably located within
48 said upward-opening cage retaining ring groove, said valve

49 member seat being spaced below said upper circumferential seat
50 by said plurality of spaced cage legs; and

51 said upper mushroom valve being driven by spring pressure
52 and fluid pressure against said upper seal upon said hydrant
53 flange breaking away and said restraining cage lifting from
54 said upper flange by fluid and spring pressure;

55 whereby, system water flows through the riser, upward
56 between said vanes, through said cage legs, and through said
57 upper flange for supply of water to the wet hydrant; and

58 whereby, upon the hydrant being accidentally impacted such
59 that the break ring shears, fluid and spring pressure acts upon
60 said valve element, driving said cage upward, away from said
61 valve and allowing said valve element to travel upward to said
62 upper circumferential seat, forming a seal therewith and
63 stopping water flow through said valve.

1 13. The valve of claim 12, said axial support shaft
2 extending axially below said axial support spider hub, said
3 valve element comprising a second, lower inverted mushroom
4 valve element, said lower mushroom valve element having a
5 mushroom shaped, generally hemispheric, lower surface and

6 having an upward extending supporting stem having an inner end
7 and a free end and defining an axial recess therein, said free
8 end extending over and slidably engaging said lower portion of
9 said axial support shaft, said lower mushroom valve element
10 having a coil spring surrounding said stem from said inner end
11 to said support spider hub;

1 said lower flange of said valve having a circumferential
2 lower valve seat ring mounted on the inner circumference of
3 said lower valve flange and defining a circumferential lower
4 valve seat at the upper end thereof, said lower seat sealing
5 against flow of fluid upon said lower mushroom valve element
6 surface engaging said lower seat;

7 whereby, upon a backpressure event occurring within said
8 valve, said valve element engages said lower seal by action of
9 spring and fluid pressure, the valve acting as a check valve
10 against backflow of fluid into the riser and supply system.

1 14. The valve of claim 12, wherein the inner side of said
2 upper flange slopes upward and outward, and said cage legs
3 extend upward and outward from said valve element seat and fit
4 against and are partially supported by the inner side of said
5 upper flange.

1 15. The valve of claim 14, wherein said valve element
2 restraining cage restraining ring is held in place by said
3 hydrant flange and said valve element restraining cage
4 restraining ring is freed upon separation of said hydrant from
5 said valve upper flange, allowing said restraining cage to
6 separate from said valve, and allowing said valve element to
7 lift and stop fluid flow.

1 16. The valve of claim 12, wherein said upper mushroom
2 surface is covered with a soft plastic layer.

1 17. The valve of claim 13, wherein said lower mushroom
2 surface is covered with a soft plastic layer.

1 18. The valve of claim 13, wherein the inner side of said
2 upper flange slopes upward and outward, and said cage legs
3 extend upward and outward from said valve element seat and fit
4 against and are partially supported by the inner side of said
5 upper flange.

1 19. The valve of claim 18, wherein said valve element
2 restraining cage restraining ring is held in place by said
3 hydrant flange and said valve element restraining cage
4 restraining ring is freed upon separation of said hydrant from

5 said valve upper flange, allowing said restraining cage to
6 separate from said valve, allowing said valve element to lift
7 under spring pressure and stop fluid flow.

1 20. A hydrant backflow check valve comprising:

2 a generally cylindrical, vertically oriented, bulbous wall
3 defining a central, vertical axis;

4 an upper flange having a circumferential recess so located
5 as to receive a break ring for breakaway attachment of the
6 lower flange of a wet hydrant;

7 a lower flange for connection with a fluid system supply
8 riser.

9 said bulbous wall being split at its midsection into upper
10 and lower generally hemispheric outer walls having engaging
11 flanges;

12 a valve element support spider having an axially located
13 hub, an outer circular rim, and a plurality of spider spokes
14 extending between said hub and said rim and spaced radially
15 therearound;

16 said outer wall engaging flanges forming corresponding
17 inner half grooves at their intersection, said outer circular
18 rim being supported within the groove formed by said half
19 grooves when said flanges are mated; and

20 a vertical, axial support shaft supported by and extending
21 axially downward forming a lower portion;

22 said valve element comprising a lower, inverted mushroom
23 valve element, said lower mushroom valve element having a
24 mushroom shaped, generally hemispheric, lower surface and
25 having an upwardly extending, supporting stem having an inner
26 end and a free end and defining an axial recess therein, said
27 free end extending over and slidingly engaging said lower
28 portion of said axial support shaft, said lower mushroom valve
29 element having a coil spring surrounding said stem from said
30 inner end to said support spider hub; and

31 said lower flange of said valve having a circumferential
32 lower valve seat ring mounted on the inner circumference of
33 said lower valve flange and defining a circumferential lower
34 valve seat at the upper end thereof, said lower seat sealing
35 against flow of fluid upon said lower mushroom valve element
36 surface engaging said lower seat;

37 whereby, upon a backpressure event occurring in said
38 valve, said valve element engages said lower seal by action of
39 spring and fluid pressure, the valve acting as a check valve
40 against backflow of fluid into the riser and supply system.